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EXAMINER

MACARTHUR, SYLVIA

ART UNIT PAPER NUMBER

1763

DATE MAILED: 08/01/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/842,650

Applicant(s)

HONGO ET AL.

Examiner

Sylvia R MacArthur

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6-8, 27, and 35-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawashima et al (US 5,192,087).

Regarding claims 1 and 6: Kawashima teaches supports (holding members) 5 and 6. There is provided an annular member 13 (rotatable member) as means for moving the supports 5 and 6. Each support 6 occupies a position departing from the wafer 2 (disc-shaped object), referred to as “the releasing position” (the holding members are allowed to swing) hereinafter, and whereby the second supports 6 are removed from the wafer 6.

Regarding claim 2: The holding members have a V-shaped groove (arc-like recess) 7 formed at a front end thereof facing the opening 4.

Regarding claim 3: The holding members are allowed to swing to a predetermined degree of angle about their own central axes.

Regarding claim 4: The holding members has a center of gravity deviated from the central axis of the holding member, see Figs. 1 and 3.

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Regarding claims 7 and 8: Fig. 1 illustrates that the first supports 5 are moved radially inward by each first projection 14, overcoming a tensile strength derived from the tensile spring (elastic body) 12.

Regarding claims 27 and 35: Kawashima teaches rotatable holding members that are disposed along a circle having a center corresponding to an axis of rotation and adapted to revolve around an axis of rotation and swing about their own central axes so that portions of the disc-shaped object (wafer 2) which engages holding members 5 and 6 are shifted when the holding members revolve. The abstract teaches supports that rotate relative to the wafer.

Regarding claim 36: The holding members have a V-shaped groove (arc-like recess) 7 formed at a front end thereof facing the opening 4. There is provided an annular member 13 (rotatable member) as means for moving the supports 5 and 6.

Regarding claim 37: The holding members have a center of gravity deviated from the central axis of the holding member, see Figs. 1 and 3.

Regarding claim 38: Kawashima teaches supports (holding members) 5 and 6. Each support 6 will occupy a position departing from the wafer 2, referred to as “the releasing position” (the holding members are allowed to swing) hereinafter, and whereby the second supports 6 are removed from the wafer 6.

Regarding claim 39: Fig. 1 illustrates that the first supports 5 is moved radially inward by each first projection 14, overcoming a tensile strength derived from the tensile spring (elastic body) 12.

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3. Claims 1-8, 27, and 35-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Shinbara (US 4,788,994).

Regarding claims 1, 27, and 35-37: Shinbara teaches a rotary plate 2 (rotatable member). Shinbara teaches a plurality of holding members (chuck pieces 1). The sliders are horizontally slidable along the arms, there are secured two chuck pieces 1a to be movable integrally (allowed to swing) with the sliders 3 to support a disc-shaped object W.

Regarding claim 2: Shinbara illustrates in Fig. 2 that the chuck pieces have a free end with an arc-like recess.

Regarding claim 3: Shinbara illustrates that the chuck pieces swing to a predetermined degree angle about their own central axes, see col. 5 lines 20-31 and col.6 lines 1-7.

Regarding claims 4 and 5: Shinbara teaches balancers 28(weights) which are rotary and have a center of gravity deviated from said central axis of the holding member.

Regarding claims 6 and 38: The wafer W is held with moveable 1a in a direction to release the wafer.

Regarding claim 7, 8, and 39: Shinbara teaches spring 15 (elastic body), which causes the holding members to engage elastically with the edge of the object.

Claim Rejections - 35 USC § 103

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4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 9-14, 16-23, 25-28, and 30-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinbara in view of Hey et al (US 6, 551, 488).

The teachings of Shinbara were discussed above.

Regarding claims 9 and 18, Shinbara fails to teach a multichamber semiconductor processing system.

Hey et al teaches a loading station 210 (carry-in and carry-out section), a dry area. A fountain plater 10 (plated metal film forming unit), a spin-rinse-dry station 212 (cleaning unit), a loading station transfer robot 228 and a robot in the mainframe transfer station 216 (these makeup a transfer mechanism)

Hey fails to teach specifically a polishing station although a plurality of processing stations 218 were disclosed in col.4 lines 40-45. The choice of introducing a polishing unit into the multichamber system of Hey is well within the skill of one designing semiconductor manufacturing equipment.

The motivation to introduce a polishing unit into the multichamber system of Hey is that polishing the semiconductor is a desired step in the manufacture of the semiconductor.

The motivation to introduce the revolution member of Shinbara into the cleaning unit of Hey is that it provides a means to spin the wafer and promote uniform processing.

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Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the revolution member of Shinbara in the cleaning unit of the multichamber system of Hey.

Regarding claims 10, 11, 19, 20 col. 34 lines 38-40 of Shinbara recites that the process cell 240 deposits a seed layer.

Regarding claims 12, 21 in Shinbara a seed layer is deposited on the diffusion barrier layer using PVD or CVD to define a plating surface, this is formed in one of the plurality of process stations 218.

Regarding claim 13 and 22, Shinbara does not teach that a cap plating unit however, the system of Shinbara does teach film forming units which are capable of performing the function of cap plating. Additionally the cap plating unit is seen as intended use limitation.

Regarding claims 14 and 23 in Shinbara teaches an integrated bevel clean (IBC) system 235 (bevel etching unit).

Regarding claims 16 and 25, the units of Shinbara are interchangeable in that the order of unit introduction is based upon the desired substrate. The transfer robot allows the substrate to be introduced to the various processing units regardless of order or orientation of the processing station.

Regarding claims 17 and 26, the electroplating unit provides a substrate holder 14 and the spin-rinse-dry station 212 is provided with a pedestal 336.

Regarding claim 28, Shinbara teaches a rapid thermal anneal (RTA) chamber 211.

Regarding claim 30, Shinbara teaches that the electrolytic cell (chemical supply system 12) contains electrolyte solution.

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Regarding claim 31, Shinbara teaches a spin-rinse-dry station 212 (cleaning unit).

Regarding claims 32 and 33, Shinbara teaches a loading station 210 (loading and unloading area), SRD modules 236, IBC systems 235 (bevel etching unit), and a plurality of process stations 218 (all of which are treatment areas), a loading station transfer robot 238 (first robot), a robot in the mainframe transfer station (second robot), and cassette receiving areas (temporary storage section).

Regarding claim 34, Shinbara teaches a rapid thermal anneal (RTA) chamber 211. Fig.3 illustrates the orientation of the units as stated.

6. Claims 15 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinbara and Hey as applied to claims 9-14, 16-23, 25-28, and 30-34 above, and further in view of Koder a et al (US 5,695,601).

The teachings of Hey and Shinbara were discussed above.

Both fail to teach a film thickness measurement unit.

Koder a teaches an apparatus for planarising a semiconductor body by CMP. Fig. 2 illustrates a thickness measuring unit 30 in which is an optical sensor 31 (detection sensor) is provided.

Koder a teaches that his apparatus offers automatic measuring of the thickness of a film after polishing. This ensures that the polishing result has been accomplished with satisfactorily, see col. 2 lines 33-37.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a film thickness measurement unit for the apparatus of Hey introduced into the multichamber system of Shinbara.

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7. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over claims as applied to claims 9-14, 16-23, 25-28, and 30-34 above, and further in view of Tanaka et al (US 6,364,094).

The teachings of Hey and Shinbara were discussed above.

Both fail to teach an aligner unit.

Tanaka et al teaches that the aligning unit 22 is designed to rotate the wafer W, which is introduced from the cassette housing chamber 12A or 12B, to detect the orientation flat or notch of the wafer W to align the wafer W.

The motivation to provide the aligner unit of Tanaka et al in the apparatus resulting from the combined teachings of Hey and Shinbara is to efficiently transfer the wafer in order to improve the throughput of the manufacturing process as discussed in col. 3 lines 1-7.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the teachings of Hey and Shinbara to include a wafer aligner as discussed by Tanaka et al.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 703-306-5690. The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m..

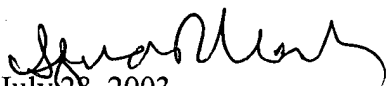
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-872-9630 for regular communications and 703-872-9630 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Sylvia R MacArthur
Patent Examiner
Art Unit 1763



July 28, 2003